

CLAIMS

WE CLAIM:

1. A write driver for driving a write current through a write head, the write driver being connected to the write head by an interconnect having an odd characteristic impedance, the write driver comprising:

means for matching an output impedance of the write driver to the odd characteristic impedance of the interconnect; and

means for generating a source current output to the write head, wherein the write current is about twice the source current of the write driver, whereby power consumption of the write driver is one fourth of a product of the source current output and the odd characteristic impedance of the interconnect during a time period of twice a transmission delay of the interconnect.

2. The write driver of claim 1, wherein the impedance matching means comprises an output resistor having a resistance substantially equal to the odd characteristic impedance of the interconnect.

3. The write driver of claim 2, wherein the source current generating means comprises means for maintaining a voltage drop on the write driver output resistor at about zero for a period of twice a transmission delay of the interconnect.

4. The write driver of claim 1, wherein the source current generating means comprises a transistor generating a pulsed current with an amplitude set by a current mirror connected to the transistor and by a reference current generator driving the current mirror.

5. The write driver of claim 1, further comprising a voltage source comprising a buffer with unity gain connected to an input of the impedance matching means.

6. The write driver of claim 5, wherein the voltage source further comprises a transistor and a resistor connected to an input of the buffer, the resistor having a resistance greater than the odd character impedance of the interconnect.

7. A write assembly for a hard disk drive storing data on a disk, comprising:

a write head with a coil writing data to a surface of the disk in response to a write current passing through the coil;

an electrical interconnect connected to the write head coil, the interconnect comprising a transmission line having an odd characteristic impedance; and

a write driver connected to the interconnect generating an output current to drive the write current through the coil, wherein the write current is about twice the output current and wherein the write driver comprises an impedance matching circuit setting an output resistance of the write driver to about the odd characteristic impedance of the interconnect.

8. The write assembly of claim 7, wherein the write driver comprises an output resistor with a resistance selected to define the output resistance of the write driver and wherein the write driver comprises a voltage source connected to the input of the output resistor.

9. The write assembly of claim 8, wherein the voltage source comprises a buffer connected to an input of the output resistor and comprises a transistor and a resistor connected to an input of the buffer, the resistor having a resistance a scaling factor larger than the odd characteristic impedance of the interconnect.

10. The write assembly of claim 9, wherein the write driver comprises a transistor generating the output current as a pulsed current, the output current transistor having a first area, and wherein the voltage source transistor has a second area defined by the first area divided by the scaling factor.

11. A write driver for selectively providing a write current through a write head in first and second opposite directions, the write driver being connected to the write head by an interconnect with an odd characteristic impedance, the write driver comprising:

a first current source connected to a first input of the interconnect providing a first source current step;

a second current source connected to a second input of the interconnect providing a second source current step, the first and second current steps each having a magnitude of about half the write current;

a first resistor connected to the first input of the interconnect having a resistance substantially equal to the odd characteristic impedance of the interconnect; and

a second resistor connected to the second input of the interconnect having a resistance substantially equal to the odd characteristic impedance of the interconnect.

12. The write driver of claim 11, further comprising a differential voltage source comprising:

a first buffer connected to an input of the first current source and to an input of the first resistor;

a second buffer connected to an input of the second current source and to an input of the second resistor;

a first transistor connected to an input of the first buffer;

a second transistor connected to an input of the second buffer;

a third resistor connected to the input of the first buffer; and

a fourth resistor connected to the input of the second buffer.

13. The write driver of claim 12, wherein the third and fourth resistors have substantially equal resistances, and wherein each of the resistances of the third and fourth resistors is about equal to the odd characteristic impedance of the interconnect multiplied by a scaling factor that is greater than one.

14. The write driver of claim 13, wherein each of the first and second current sources comprise a transistor and wherein the first and second transistors of the differential voltage source each have areas defined by dividing an area of one of the transistors of the current sources by the scaling factor.

15. The write driver of claim 11, wherein the write driver is configured to have power consumption defined by the product of the square of the write current and

odd characteristic impedance of the interconnect divided by four for a period of time equal to twice a transmission delay of the interconnect.

16. A method for use in a hard disk drive for driving a write current through an inductive coil in a write head with improved control over propagation of reflected waves from the write head and with reduced power consumption, comprising:

first driving a write current in a first direction through the write head coil, wherein the first driving comprises operating a write driver to provide a first source current to an interconnect connecting the write driver to the write head, the source current having a magnitude of about half a magnitude of the write current in the first direction and wherein the write driver has a first output resistance substantially equal to an odd characteristic impedance of the interconnect; and

second driving a write current in a second direction through the write head coil, wherein the second driving comprises operating the write driver to provide a second source current to the interconnect, the source current having a magnitude of about half a magnitude of the write current in the second direction and wherein the write driver has a second output resistance substantially equal to the odd characteristic impedance of the interconnect.

17. The method of claim 16, wherein the first driving comprises operating a first voltage source to apply a voltage drop to the first output resistance and the second driving comprises operating a second voltage source to apply a voltage drop to the second output resistance and further wherein for a period of time after transition from either of the first and second driving, the first and second voltage sources apply no voltage drop on the first and second output resistances, the period of time being equal to about twice a transmission delay of the interconnect.